Why a Gunk World is Compatible with Nihilism about Objects

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Ted Sider argues that nihilism about objects is incompatible with the metaphysical possibility of gunk and takes this point to show that nihilism is flawed. I shall describe one kind of nihilism able to answer this objection. I believe that most of the things we usually encounter do not exist. That is, I take talk of macroscopic objects and macroscopic properties to refer to sets of fundamental properties, which are invoked as a matter of linguistic convention. This view is a kind of nihilism: it rules out the existence of objects; that is, from an ontological point of view, there are no objects. But unlike the moderate nihilism of Mark Heller, Peter van Inwagen and Trenton Merricks that claims that most objects do not exist, I endorse a radical nihilism according to which there are no objects in the world, but only properties instantiated in spacetime. As I will show, radical nihilism is perfectly compatible with the metaphysical possibility of gunk. It is also compatible with the epistemic possibility that we actually live in a gunk world. The objection raised by Ted Sider only applies to moderate nihilism that admits some objects in its ontology.

Keywords: ontology, metaphysics, gunk, nihilism, object, spacetime, space, time

1. Between a Nihilist World and a Gunk World

Ted Sider (1993) argues that nihilism about objects is incompatible with the metaphysical possibility of gunk and takes this point to show that nihilism is flawed.[1] I believe him to be right. However, I want to develop a new kind of nihilism in order to escape the argument. First, let me explain what gunk is. An object is made of gunk if it is composed of spatially atomless stuff: it

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[1] Sider has changed his mind on this topic and now endorses nihilism. He offers a different answer to the objection he raised in 1993, based on a particular metaphysics of modality: modal deflationism. An advantage of my own proposal is that it remains neutral with respect to the metaphysics of modality. See his draft "Against Parthood" on his website.

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can be infinitely divided into smaller and smaller spatial parts (or equivalently, in a four-dimensional view, into spatio-temporal parts). So, an object made of atomless gunk does not admit of simple mereological parts; for each proper spatial part of the object, this very part has some smaller proper spatial parts, and each of those parts has again some yet smaller parts. It was first discovered that atoms are not really atoms: they are composed of neutrons, protons and electrons. Then we discovered that neutrons and protons are composed of quarks. If we live in a gunk world, we will never find out some fundamental level of physical reality, and particles will infinitely admit smaller and smaller particles as proper parts. Hence, a gunk world is a world like ours, except that it is not composed of mereological simples, but of gunk. For the sake of argument, I will follow Sider and conceive of a gunk world as ruling out living entities; instead I will focus on inanimate entities and thereby ensure that the very matter we are considering here remains unconnected to the difficulties of accounting for living things.

To be sure, in support of his argument Sider does not need to rely on the fact that we actually live in a gunk world. What he needs is just the metaphysical possibility of a gunk world. But notice that it is because it seems possible that our actual world is a gunk world that the metaphysical possibility of a gunk world appears so convincing to Sider. While this argument was formulated with van Inwagen's quasi-nihilism in mind,[2] I will reformulate it to fit nihilism. This move does not involve a major break. Sider himself writes in a footnote (Sider 1993, 286): "My argument, if successful, refutes not only [Quasi-nihilism], but also the view van Inwagen calls 'Nihilism', according to which no composite objects exist".

2. Sider's Argument

The nihilist claim seems to highly contradict common sense. After all, who would like to buy the thought that all objects of ordinary life are unreal? I see the table right in front of me, and I have *prima facie* no reason to doubt of its existence. To make the nihilist claim plausible, an error theory is required: an explanation of why I count those objects as being real although they are not has to be provided. This explanatory work is to be done by the paraphrase strategy. Sentences about ordinary objects are said to be false, even though they seem to be true, because there are complicated truths corresponding to those falsehoods. As Sider writes:

> What are the complicated truths that we do not bother to assert, uttering instead falsehoods like "there are some tables"? Complicated

[2] According to quasi-nihilism, composition sometimes occurs under special conditions. For instance, for van Inwagen it merely occurs when there is an activity of life.

> assertions about the smallest parts of the "tables". Rather than claim that there are many fundamental particles here in my "room" next to my "chair", which particles behave so as to prevent my "computer", "keys", and "briefcase" from falling to the "floor", instead I say simply "There's a table in my room". (Sider 1993, 286)

The paraphrase strategy is attractive because it is a lot simpler to act as if the alleged objects were real. It makes sense to think that we need shortcuts to refer to complicated arrangements of particles. In other words, a nihilist defends that only paraphrase assertions are true, when ordinary assertions are false (like 'there is a table in my room'). This is because ordinary assertions are the conjunction of two components, one that is literally true (what is conveyed by the paraphrase assertion), and something more that is not. This supplementary implicit assertion is an existential one. The ordinary assertion conveys the idea that there is not only the arrangement of the parts, but also a whole that literally exists, the table in our example. In daily life, it does not matter if the existential component is true: indeed, it does not make any concrete difference with respect to our actions and practical beliefs. To sum up, an existential sentence about an ordinary object is false because it is composed of a true component, the paraphrase description, and a false one, the genuinely existential component. According to the nihilist, absolutely all sentences about ordinary objects are false in this way.

What is important is that the nihilist needs the paraphrase strategy. More exactly, she needs an error theory and the paraphrase strategy is the only natural candidate to do such a work. This is what Sider advocates in his paper: the nihilist needs the paraphrase strategy, but she cannot buy it. Indeed, the aim of Sider's argument is to show that "there are (or rather, might have been) situations in which 'objects' like tables and chairs are not composed of fundamental particles". If this is true, then the nihilist loses her way to explain the alleged contradiction with common sense, she cannot provide an error theory of why we constantly (and falsely) believe that we are referring to objects:

> So, van Inwagen can respond to the criticism that his view contradicts common sense. [But] van Inwagen's procedure for softening the harsh dictates of [Quasi-nihilism] will not always work, for there are (or rather, might have been) situations in which "objects" like tables and chairs are not composed of fundamental particles. (Sider 1993, 286)

Now that we have seen why the nihilist cares so much about the paraphrase strategy, it remains to be understood what is problematic about this strategy. Here is one way to put Sider's argument:

(1) Necessarily, there are no composite objects (nihilist hypothesis).

(2) Necessarily, "composite objects" are arrangements of mereological simples (paraphrase hypothesis).

(3) Gunk worlds are metaphysically possible (gunk hypothesis).

(4) In gunk worlds, "composite objects" are not arrangements of mereological simples (per the definition of a gunk world).

(5) In gunk worlds "composite objects" both are and are not arrangements of mereological simples (2 & 4).

So from the three hypotheses follows a manifest contradiction, (5). The nihilist has a general way of explaining our ordinary talk about ordinary objects that accounts for our intuition that there are objects. But this explanation is not available in a gunk world: there are no particles in such a world, and the paraphrase strategy cannot be used in order to explain our intuition that there are objects. Indeed, if we believe that there are tables, it is because there are particles arranged tablewise. But in a gunk world we would have the same intuition that there are objects, and the paraphrase strategy would not work.

First, (1) and (2) might seem to be dubious. Why would we need this operator of necessity? Why could we not stick to an actualist version of (1) and (2): 'In the actual world, there are no composite objects' and 'In the actual world, 'Composite objects' are arrangements of elementary objects'? This strategy, Williams (2006, 493) names it the contingency defense: "[it] maintains that nihilism is true of the actual world; but that at other worlds, composition occurs". But Williams proposed strong arguments against the view that mereological nihilism might be contingently true. I do not want to deal with these contingentist considerations here. What I will do, however, is show that it is possible to propose an account of the compatibility between nihilism and the possibility of gunk that remains neutral on the modal status of metaphysical claims.[3]

It is important to see that (2) rests on the assumption of mereological atomism, the idea that a paraphrase strategy requires an atomist ontology. But should it not be possible to provide a paraphrase that is not committed to mereological atomism, but a gunky ontology instead?[4] It seems to be an easy way out. And it is. A "table" could be said to be unreal, the tag 'table' referring to a part of gunky stuff that is tablewise. As Sider (1993, 286) explains:

[3] For a defense of contingentism in metaphysics, see (Rosen 2006) and (Miller 2009, 2010, 2012). I find the contingentist claim very strong because it generates epistemological worries: either metaphysical claims are to be known *a posteriori* because they are contingent, or they are contingent and *a priori*. In both cases, an epistemological account is required.

[4] I thank an anonymous referee for having raised this interesting question.

> Surely there is a gunk world in which some gunk is shaped into a giant sphere, and another where some gunk has the shape of a cube. Surely, there are gunk worlds that most of us would describe as containing objects much like objects from our world: tables and chairs, mountains and molehills, etc.

This strategy seems to work. However, the difficulty will re-appear in just the same way. Either the gunk ontology is necessarily true, or it merely holds contingently in the actual world. Let us have a look at the two cases. If the world is necessarily gunky, then we have to substitute (2) with (2'):

(2') Necessarily, "composite objects" are arrangements of gunky stuff (paraphrase hypothesis).

If the gunk ontology is necessarily true, then we have to rule out the metaphysical possibility of an atomistic world. In the same way that we want to ground the metaphysical possibility of gunk worlds, the metaphysical possibility of atomistic worlds should not be denied. Hence, it is not an option to replace (2) with (2').

On the other hand, if a gunk ontology holds in a contingent way in the actual world, we would have to drop (2) in favor of (2"):

(2") In the actual world, "composite objects" are arrangements of gunky stuff (paraphrase hypothesis).

Then we need to endorse once again the contingentist claim that some metaphysical claims are contingently true.

What about (3), the claim that gunk worlds are metaphysically possible? Could we not just accept that this alleged possibility is illusory? According to Sider (1993, 288) this is strongly problematic:

> This is what I find implausible. [...] I find the possibility of gunk so compelling that I am willing to reject any theory that rules it out.

Indeed, the possibility of gunk should be taken seriously before we even think of rejecting it as being illusory. I think that a lot of philosophers would be glad to accept this possibility based on our intuitions: then, another way to block Sider's argument would be more than welcome. We definitely have to *try* to account for this intuition. Still, Williams (2006) endorses this view that he calls the *impossibility defense*: gunk worlds are not possible. According to him, Sider is not only expressing a personal intuition, but he is also using a kind of conceivability argument: gunk worlds are conceivable, then gunk worlds are possible. But once again, a nihilist solution that deals with a genuine gunk possibility seems to be in a better dialectical situation than one that has to reject it as being merely illusory.

For now, we have seen two ways of challenging Sider's argument. First, contingentism about nihilism could be endorsed by rejecting (1) and (2). Secondly, the metaphysical possibility of gunk worlds could be taken to be merely illusory by rejecting (3). Both of these solutions have their own advantages and costs. I would like to propose a third solution that I take to be original. More of that, I take my solution to be interesting with respect to the two first ones because it remains neutral on the modal matters, by showing that a very same world can be both nihilist and gunky in a robust sense.

To do that I challenge (4). I advocate that the definition of a gunk world does not rule out the presence of mereological simples in this world. More precisely, I deny the identification of mereological simples to elementary objects. I will show that gunk worlds can be conceived of as not lacking mereological simples. Roughly, my move will involve the claim that properties can play the role of mereological simples in a gunk world instead of elementary objects. Then, the kind of nihilism that defines objects in terms of conventions linking properties (instead of particles) is compatible with both a gunk ontology and an atomistic one.

3. Toward a New Radical Nihilism

A certain kind of nihilism provides resources for dealing with Sider's objection. According to this view, what exists is only spacetime and properties directly instantiated at spacetime points. Such a position is distinct, but close to some ideas of Schaffer (2009) and Heller (2008). To be sure, Jonathan Schaffer is not a nihilist. He believes that objects are real and identifies them to regions of spacetime:

> [G]iven that spacetime is one sort of substance, should material objects be regarded as a second distinct sort of substance? [...] No, says the monistic substantivalist. Spacetime is substance enough. There is no need for the dualism of the contained and the contained (or for fundamental containment relations). When God makes the world, she need only create spacetime. Then she can pin the fundamental properties directly to spacetime. (Schaffer 2009, 133)

Substantivalism states that spacetime is a substance, in accordance with the Aristotelian criterion of fundamentality: it is a substance whose existence does not depend on the existence of something else. Schaffer defends such a view and states that the world does not need to be created with more ingredients than spacetime and properties to be the very world we are living in. In this, he endorses *monistic substantivalism*: there is no need for a further class of substances.

But Schaffer is not a nihilist about material objects. Indeed, he endorses what he calls the *identity view*. According to this view, material objects are

identical to spacetime regions. He conceives of spacetime regions as pincushions for properties. Schaffer claims that, because properties can be construed as being instantiated by spatiotemporal regions, spatiotemporal regions are to be identified with objects.

But he (Schaffer 2009, 133) goes on to say:

> But the monist needs not hold the identity view. She might hold the eliminative view, which denies the existence of material objects altogether.

He takes the eliminative view of monistic substantivalism, the view that there are no material objects, to be inferior to the identity view of monistic substantivalism. I believe him to be wrong, but here is not the place to argue so. What is of interest for my current purpose is that the eliminative view of monistic substantivalism opens up new possibilities to be a nihilist. If classical nihilism takes mereological simples to be particles, the eliminative view of monistic substantivalism offers new candidates for mereological simples: natural properties.

Mark Heller endorses a different view but also endorses the idea of a world constituted of properties located within spacetime:

> I proposed that a complete description of the universe can be given by describing the locations at which the fundamental properties are instantiated. What I need to emphasize here is the proposed completeness of this minimal description.The universe, as things actually are, can be completely described without mentioning, for instance, donkeys. I leave out nothing by not mentioning donkeys. This sounds more daring than it is. I do not deny that there are donkeys. The English sentence "there are donkeys" is true. This is compatible with my claim that the minimal description is complete, because "there are donkeys" is part of a higher level description of those same facts that can be described more minimally. [...] Whenever the fundamental properties are distributed thus-and-so, the region in which they are distributed can be described as containing a donkey. Of course, describing the region in donkey-terms is less specific than describing it in more fundamental terms. There are ever so many ways the properties could be distributed that would make a donkey-description appropriate. (Heller 2008, 88)

It might seem odd to characterise Heller as being a nihilist; he is not denying that there are donkeys, or more generally, ordinary objects. Still, according to Heller, objects are real but are not mind-independent. This is the Conventional Theory of Objects. So, strictly speaking, Heller is not a nihilist about ordinary objects: he assumes the existence of objects. But these alleged objects are overdetermined descriptions of properties located within spacetime. He writes:

> The Donkey Problem (as I am calling it) concerns the relationship between more and less fundamental ontologies. [...] The less fundamental objects are merely conventional. This conventionalism has consequences for the 3D/4D debate. Four-dimensionalism is motivated by a desire to avoid coinciding objects, but once we accept that the non-fundamental ontology is conventional there is no longer any reason to reject coincidence. (Heller 2008, 83)

Heller writes that "less fundamental objects are merely conventional". There is then an ambiguity. What is the fundamental ontology: an ontology of physical objects, or an ontology of properties located within spacetime? I am not sure of Heller's exact position. However, I believe he is inclined toward monistic substantivalism here, the idea that, fundamentally, all there is are properties located within spacetime.

To sum up, Schaffer and Heller take primary ingredients of the world to be properties located within spacetime (the question of the precise nature of spacetime is not relevant here). Fundamentally, the view is that there are not any kinds of objects, or particles. Schaffer cashes objects out by the identity view, whereas Heller obtains them with his conventional theory of lesser fundamental ontologies. I will not discuss the advantages and drawbacks of these views here. But the moral to be drawn from Schaffer and Heller is that, what exists primarily, might be properties located within spacetime. And it is an easy move to be a nihilist with this kind of fundamental ontology: it only requires dropping the identity view (in the case of Schaffer) or the conventional theory of objects (in the case of Heller) to be a nihilist.

Monistic substantivalism takes spacetime as primitive; the spacetime network is a substance (or many substances, if substances are to be identified with spatiotemporal regions, but this is another story). In rejecting (4), the claim that a gunk world lacks mereological simples and cannot be inhabited by "composite objects", I want to emphasize that natural properties are mereological simples or, at least, that some spare properties are mereological simples. A gunk world is inhabited by properties in the same way, such that, for example squareness can be instantiated in different places. In the same way a spare property, such as the property of generating an electromagnetic field, inhabits a mereological atomistic world, it does so in a gunk world. Therefore, if I am right that the concept of mereological simples can fall under two distinct categories, the category of objects and the category of properties, we have opened up space for conceiving of a gunk world as both containing one kind of mereological simples (properties) and lacking another kind of mereological simples (elementary particles).

Let's take an example, the cup of tea in front of me. For the sake of clarity, let's begin with the assumption of an atomistic world. The cup has properties, such as color, fragility or shape: it's brown, fragile and has a particular shape.

Arguably, these properties are macroscopic ones. Usually, we conceive of parts of objects as having properties too, grounding macroscopic properties. A particular molecular structure of the cup makes it fragile for instance. The naive account of object is that it is composed of elementary particles having properties. And importantly, of fundamental particles having *fundamental properties*. The cup is then a composite object having composite properties (it's brown and fragile), and it is composed of fundamental objects (particles) having fundamental properties (for instance, gravitational and electromagnetic fields).

Now, if we live in a gunk world, this cup is infinitely divisible into smaller and smaller spatial parts, and there are no particles doing the job of being the elementary fabric of the cup. It means we have to drop the category of fundamental objects, that is, particles. In this case, the cup is not composed of fundamental objects, because the category of fundamental objects is empty. Still, rejecting fundamental objects is *prima facie* neutral about the possible existence of fundamental properties. If there would be such fundamental properties, it seems we would have here genuine candidates for being mereological simples, entities that need to be carefully examined.

But it could be asked whether a gunk world inhabited of fundamental properties is even coherent. Should a gunk world not be conceived of as globally lacking mereological simples, including properties? The gunk world hypothesis describes a world infinitely divisible into smaller and smaller parts, and says nothing about properties. So if the world is not composed of objects but of properties, it might be the case that properties are infinitely divisible into smaller and smaller properties. However, this kind of gunk view would be highly problematic. Indeed, how could we conceive of properties as being infinitely divisible into ever smaller parts? In order to get a grip on this problem, we need to introduce a distinction between logical and extensive mereology.

Following L. A. Paul (2002), we can distinguish between extensional and logical parts of an object: a chair, for instance, is extensively composed of smaller spatial parts and is logically composed of properties, such as, being red, having a curved armrest, having a flat seat, or having a location. One could ask if this logical mereology is genuinely a kind of mereology. Indeed, this approach is at odds with classical mereology. Here it could be useful to have a look at what Kit Fine writes on the subject:

> Now, on the face of it, there would appear to be a wide variety of basic ways in which one object can be a part of another. The letter "n" would appear to be a part of the expression "no", for example, and a particular pint of milk part of a particular quart; and if these two relations of part are not themselves basic (perhaps through being restricted to expressions or quantities), there would appear to be basic

> relations of part that hold between "n" and "no" or the pint and the quart. It is also plausible that the way in which "n" is a part of "no" is different from the way in which the pint is a part of the quart. For if the two ways were the same, then how could it be that two pints were only capable of composing a single quart, while the two letters "n" and "o" were capable of composing two expressions, "no" and "on". (Fine 2010, 562)

This is not the place to discuss how many kinds of mereology there are. But I shall emphasize that it is *prima facie* attractive to endorse Fine's view of a plurality of kinds of mereological relations. Then, L.A Paul's logical mereology could be acknowledged as a particular species of mereology, and the classical approach might turn out to be too restrictive. What I want to do now is to examine if this logical approach can help us in one way or another to get a grip on the idea that properties could be composed of parts.

Importantly, objects and properties are fundamentally different *vis-à-vis* mereology. Objects are involved both in extensional mereology and logical mereology. By contrast, properties are legitimate candidates for mereology only in the case of logical mereology. That is, an object can be analyzed as being composed of smaller spatial parts (extensional mereology), but it can also be analyzed as being composed of ontological ingredients, such as, properties, relations, substrata, bundling relations, or whatever you take to be included in the fundamental ontology of the world (logical mereology). By contrast, a property cannot be extensionally composed of smaller parts.[5]

The concept of property is not a geometrical concept and, thus, is not linked to considerations about extension. Only logical mereology could be used for characterizing properties, such that a property could be composed of simpler constituents. For instance, if you take spare properties to be dispositional properties, a spare property is composed of an actuality (the property strictly speaking), a potential or actual manifestation, and a relation between the property and the manifestation. Note that I am not accepting this description to be true, but only wish to provide an example of what a logical mereology applied to properties would look like.

A gunk world is a world lacking mereological simples in the sense of extensional simples. But it remains neutral on the existence of mereological simples in the sense of logical simples. The point of the concept of gunk is that matter, whatever it might be, is infinitely divisible into smaller parts,

[5] L. A Paul (2002, 579) writes "The microparticles might not have proper spatial parts, but they may still be composed of 'smaller' qualitative parts such as having mass and having charge". I think that the concept of smallness or generally size should be abandoned in the case of logical mereology. The concept of "being smaller" is linked to space and extension and should not be used for describing logical mereology. Reserving it for extensional mereology could help avoid confusion.

where 'smaller' acts as an extensional concept. However, one might want to advance a novel gunk hypothesis, where, the world would be likewise gunk, yet not in the extensive, but only in the logical sense. A proponent of "logical gunk worlds" would maintain that the world is not ontologically grounded, since no fundamental entities exist.[6] Instead, there would be an infinitely fine-grained analysis as for every constituent of the world. For instance, properties could be composed of potentialities composed of X composed of YZ, and so on. Even though I do not have a knockdown argument against this view, the concept of worlds of logical gunk is not helpful with the very problem I am addressing here. It would imply that any hope of advancing a fundamental ontology of the world would evaporate. It is indeed incompatible with the realistic idea of a world with a fundamental ontological structure that has to be discovered. If it is a philosophical hypothesis of any interest, it is certainly not what is questioned here. A logical gunk world would be incompatible with nihilism, because it would be impossible to provide a paraphrase for such a possible world: there would simply be no fundamental entities that could be described by way of constructing a paraphrase.

That is not to say that a new argument against nihilism could not be based on the metaphysical possibility of logical gunk. But it would be a new argument, very different from the one based on the metaphysical possibility of extensional gunk that I am dealing with in this paper. Still, the metaphysical possibility of a logical gunk world is far less tempting than the metaphysical possibility of an extensional gunk world. I believe this view to be bad for two reasons. First, it is not even clear whether talking about ever more fundamental constituents of a property or a relation is at all coherent. Secondly, this kind of logical gunk view generates an infinity of ontological primitives. For any ontological category of entity, there would be further categories it is composed of in turn. It involves surrendering the principle of ontological parsimony in the worst possible way: we would end up with an infinity of kinds of entities. A choice has to be made between a logical gunk hypothesis and a fundamental ontology. Nihilists clearly side with the idea of a fundamental ontology. After all, this is precisely because they believe in

[6] Monism about fundamentality is what Karen Bennett (2011, 2) calls flatlandism. According to this view, there is only one "level" of reality: for any hypothetical entity x, either x does not exist or x is fundamental. On the other hand, a lot of philosophers are pluralists and think there are different ontological levels of reality, with some being more fundamental than others. A pluralist can defend both that there is a finite number of levels, or that there is an infinite number of levels. In the first case, she endorses the classical view according to which there is a fundamental ontological level; in the second case, she endorses the logical gunk view, according to which there is no fundamental level, but ever infinitely more fundamental levels.

the existence of fundamental ontological things in the world that they do not believe in macroscopic objects. In a nutshell, a logical gunk world rests on ontological priority of the macroscopic world over the constitutive one: the alleged whole is primary with respect to its alleged fundamental parts (indeed, the fundamental parts are not real). On the contrary, a nihilist world rests on the idea that what is real is what there is at the fundamental level: the alleged parts are more important than the alleged whole (indeed, the whole is not real).

I will now tackle the claim that the metaphysical possibility of classical gunk (extensional gunk) is incompatible with the paraphrase strategy. The problem is that Sider was only thinking about the kind of moderate nihilists who endorse the existence of some fundamental objects (particles). But there is another class of nihilists who endorse the claim that there are no objects in the world, and properties are all there is. Both radical nihilists and moderate nihilists endorse mereological nihilism according to which composition of ordinary objects never occurs. Where they part company is when it comes to the question of what ontological ingredients there are in the world. For moderate nihilists, these are particles (or particles plus spare properties), that is, objects. For radical nihilists, these are only properties.

Evidently, radical nihilism relies on a robust ontology of properties. Properties are directly instantiated in spacetime, and what we call objects are just conventions corresponding to sets of properties located in some spacetime regions. To achieve this goal it is enough to show that a world that is both gunky and Eliminativist Supersubstantivalist (ES henceforth) is metaphysically possible. Indeed, if the paraphrase strategy is reliable both in an atomistic and a gunk world, and can account for our intuition that there are objects, then the account of ordinary objects remains neutral with respect to the presence or lack of mereological simples, understood as particles. Recall that it was precisely Sider's strategy to show that van Inwagen's paraphrases were not able to do the job in a gunk world. It follows that we have to show that in a gunk world a paraphrase strategy in terms of properties is more efficient than a paraphrase strategy in term of particles.

We are concerned with an extensive gunk world, where there are no extensive mereological simple objects: each object admits of ever smaller parts. Yet, arguably, a gunk world is not a logical gunk world, because it permits a primitive ontology, for instance, of objects and properties. An extensive gunk world is compatible with an ES world. But it might be asked how a world without objects could be gunky, if gunk theory is a theory about parts of objects. Nevertheless, there is a natural reply. In an ES world, a gunk view is now not a theory about parthood pertaining to objects and their parts, but a theory about parthood obtaining between spacetime regions and their

parts. It is still a theory about objects, in the sense that it is a theory about the region of spacetime we dub objects. Under an ES assumption, a cup is not an object, because there are no objects at all in the world (neither simple nor composite), and the alleged cup is a particular region of spacetime. The gunk view therefore shifts from an ontology of objects to an ontology of spacetime.

4. Conclusion

Our discussion has shown that a radical nihilist is perfectly able to account for the metaphysical possibility of a gunk world. Paraphrases target sets of properties instantiated in the pattern of spacetime. Radical nihilism, as we have interpreted it, is even compatible with the possibility that we may actually be living in a gunk world. Sider's argument is only threatening the classical kind of nihilism, according to which some objects (the particles) exist and play the role of grounding entities in paraphrases. By comparison, radical nihilism provides the resources for dealing with the metaphysical possibility of gunk and the epistemic possibility that we actually live in a gunk world. Not surprisingly, I suggest, therefore, the following thesis about the actual world: tables and chairs *do not exist* after all.

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